

**Title Submitting To AGU:** Hyperspectral Biofilm Classification Analysis for Carrying Capacity of Migratory Birds in the South Bay Salt Ponds

**Abstract:** (210 words)

Tidal marshes are highly productive ecosystems that support migratory birds as roosting and over-wintering habitats on the Pacific Flyway. Microphytobenthos, or more commonly 'biofilms' contribute significantly to the primary productivity of wetland ecosystems, and provide a substantial food source for macroinvertebrates and avian communities. In this study, biofilms were characterized based on taxonomic classification, density differences, and spectral signatures. These techniques were then applied to remotely sensed images to map biofilm densities and distributions in the South Bay Salt Ponds and predict the carrying capacity of these newly restored ponds for migratory birds. The GER-1500 spectroradiometer was used to obtain in situ spectral signatures for each density-class of biofilm. The spectral variation and taxonomic classification between high, medium, and low density biofilm cover types was mapped using *in-situ* spectral measurements and classification of EO-1 Hyperion and Landsat TM 5 images. Biofilm samples were also collected in the field to perform laboratory analyses including chlorophyll-*a*, taxonomic classification, and energy content. Comparison of the spectral signatures between the three density groups shows distinct variations useful for classification. Also, analysis of chlorophyll-*a* concentrations show statistically significant differences between each density group, using the Tukey-Kramer test at an alpha level of 0.05. The potential carrying capacity in South Bay Salt Ponds is estimated to be 250,000 birds.

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